REMARKS

Claim 1 has been amended to incorporate therein the recitation of claims 3 and 22. Claim 3 has been canceled. Claims 4, 29 and 36 have been amended to depend from claim 1. Also, enclosed is a partial translation of JP 8-259743 cited by the Examiner.

Review and reconsideration on the merits are requested.

In response to the rejections of claims 36-38 under 35 U.S.C. § 112, second paragraph, claim 36 has been amended so as to include the chemical structure and definition of the thermal stabilizer represented by Formula (II). Withdrawal of the rejection is respectfully requested.

Claims 1-4, 22 and 24-38 were rejected under 35 U.S.C.§ 103(a) as being unpatentable over EP 0 006 493, EP 0 007 514, U.S. Patent 5,879,746 or JP 55-16058 in view of U.S. Patent 6,107,390, U.S. Patent 3,941,603 or JP 8-259743.

EP '493 was cited as teaching melt-processable fluorine-containing resin compositions containing a combination of thermal stabilizers within the scope of the rejected claims. The melt-processable fluorine-containing resin composition may further contain a pigment such as titanium dioxide, citing page 12, lines 16-17. EP '514, U.S. '746 and JP '058 are said to be cumulative.

The Examiner relied on U.S. '390, U.S. '603 and JP '743 as teaching the use of a surface-treated rutile titanium oxide as having a high level of hiding power, gloss and dispersibility.

U.S. '746 was cited as teaching the coating of substrates contacting corrosive chemicals.

The reason for rejection was that it would have been obvious to employ the surface-treated rutile titanium oxide of U.S. '390, U.S. '603 of JP '743 in each of the primary references

for the reason that (i) the primary references teach the use of pigments such as titanium dioxide, and (ii) the advantages of surface-treated rutile titanium oxide are well known in the art.

Applicants respectfully traverse for the following reasons.

The present invention, as defined in amended claim 1, relates to a fluorine-containing resin powder coating composition to be subjected to baking at 300°C or more. The fluorine-containing resin composition for forming a coating film comprises a fluorine-containing resin, a thermal stabilizer and surface-treated rutile titanium oxide particles as a whitening agent. Furthermore, the powder coating composition gives a baked coating film having a whiteness of 60 or more after baking at 300°C or more.

The closest primary reference is EP '493. The object of EP '493 is to provide a film having excellent chemical and thermal resistance (page 6, lines 26-27). Example 38 of EP '493 discloses a powder composition comprising a TFE/HFP (88/12) copolymer (FEP) and a thermal stabilizer mixture of 4,4-bis(α,α-dimethylbenzyl)diphenylamine and the zinc salt of 2-mercaptobenzothiazole (corresponding to Stabilizer II according to the present specification). The powder composition is sintered at 345 ± 5 °C (page 14, lines18-20). Further, EP '493 discloses that a pigment may be added, and that the pigment may be titanium dioxide (page 12, lines 14-19).

Namely, EP '493 discloses a composition of FEP and Stabilizer II. Titanium dioxide may be added as a pigment, and the composition is baked at 300 °C or more.

According to EP '493, the effects were evaluated in terms of foaming and high pressure steam resistance. However EP '493 is silent as to whiteness of the baked film, because whiteness does not relate to chemical and thermal resistance.

Thus if a person skilled in the art were to add titanium dioxide to the composition of Example 38 of EP '493, such addition must not adversely affect the objective of EP '493, namely, excellent chemical and thermal resistance of the coated film.

As is clear from comparison of Example 1 with Comparative Example 6 and from the comparison of Example 3 with Comparative Example 5 in Table 1 at pages 16-17 of the present specification, addition of commonly used titanium dioxides (non-treated rutile titanium dioxide (FR-22) and non-treated anatase titanium dioxide (FA-65)) may disadvantageously worsen the degree of foaming from A to C.[1] From these results, a person skilled in the art in reading EP '493 would hesitate to add common titanium dioxide. On the other hand, only surface-treated rutile titanium oxide can satisfy the whiteness of 60 or more and also maintain good foaming resistance.

The examiner cited U.S. Patent 6,107,390, U.S. Patent 3,941,603 and JP 8-259743 as second references which disclose surface-treated rutile titanium oxide.

However, it should be recognized that the object of EP '493 is to obtain a baked film <u>without</u> foaming and having high pressure steam resistance. As mentioned above, because common (non-treated) titanium dioxide imparts unacceptable defects and foaming, one of ordinary skill in formulating the composition of EP '493 would be quite hesitant to add titanium

[1] Under criteria A, no foaming is observed. Under criteria C, foaming is observed on the entire surface.

dioxide <u>in any form</u>. Thus, a person skilled in the art would be motivated to employ surface-treated rutile titanium dioxide as the pigment (titanium dioxide) of EP '493 (as suggested by the Examiner) <u>only if the secondary references also teach that surface-treated rutile titanium oxide inhibits foaming when baking at a temperature of 300°C or more</u>. However, the secondary references are entirely silent regarding this point, such that there is no motivation and every reason <u>not</u> to employ titanium dioxide, let alone surface-treated rutile titanium oxide as the pigment of EP '493. In other words, there is nothing in the prior art which teaches the desirability, and hence the obviousness of making the substitution suggested by the Examiner.

According to US '390, the surface treatment of titanium dioxide enhances light stability and dispersibility of titanium dioxide (column 3, lines 6-9), and the titanium dioxide may have any structure of anatase-type and rutile-type (column 2, lines 63-64). Of course, the composition described therein is not subjected to baking at 300 °C or more. Thus, there is no teaching that the surface-treated rutile titanium oxide <u>inhibits foaming of the coated film when baked at 300 °C or more</u>.

According to US '603, the surface-treated rutile titanium dioxide exhibits a high level of hiding power, gloss and dispersibility, especially when employed in industrial paints based upon water reducible systems (column 1, lines 30-34). Of course, the composition described therein is not subjected to baking at 300 °C or more. Thus, there is no teaching that the surface-treated rutile titanium oxide <u>inhibits foaming of the coated film when baked at 300 °C or more.</u>

According to JP '743, the surface-treated rutile titanium dioxide is added to prevent polyolefin resins such as polyethylene and polypropylene from yellowing and to enhance

dispersibility ([0001], [0007]). The yellowing is due to the reaction of a stabilizer (antioxidant) such as 2,6-di-tert-butyl-4-methylphenol (BHT) with active sites of the surface of titanium dioxide as pigment ([0004]). The yellowing is evaluated by irradiation of black light (UV) ([0012]), but not by baking at 300 °C or more. Thus, there is no teaching that the surface-treated rutile titanium oxide inhibits foaming of the coated film when baked at 300 °C or more.

As explained above, addition of titanium dioxide to the composition of EP '493 undesirably results in foaming and the formation of defects when the coating is baked at a temperature of 300 °C or more. Thus, one of ordinary skill would not be inclined to add titanium dioxide to the composition to EP '493. Thus, in order to allow for the combination suggested by the Examiner, there must be something in the prior art which suggests the desirability, and hence the obviousness of employing surface-treated rutile titanium oxide as the pigment (titanium dioxide) of EP '493. However, each of the secondary references employs surface-treated rutile titanium dioxide for reasons unrelated to and, more importantly, irrelevant to EP '493. Moreover, none of the secondary references discloses a composition which is subjected to baking at 300 °C or more, such that the considerations for applying and employing titanium dioxide, whether it be common or surface-treated rutile-type, are entirely different from those of EP '493. Of course, none of the secondary references teaches or suggests that only surface-treated rutile titanium dioxide can inhibit foaming of the coated film when baked at 300 °C or more. Accordingly, the disclosure of the secondary references do not motivate a person skilled in the art to employ surface-treated rutile titanium oxide as the pigment (titanium dioxide) of EP '493.

This is especially the case considering the adverse affect due to use of common (non-treated) titanium oxides.

Furthermore, Applicants believe that the effect of the surface-treated rutile titanium oxide, namely, a pigment that can satisfy both a whiteness of 60 or more while maintaining good foaming resistance when baked at 300 °C or higher, is unexpectedly superior over the prior art applied by the Examiner.

For the above reasons, it is respectfully submitted that the amended claims are patentable over the cited prior art, and withdrawal of the foregoing rejection under 35 U.S.C. § 103(a) is respectfully requested.

Withdrawal of all rejections and allowance of claims 1, 2, 4, 22 and 24-38 is earnestly solicited.

In the event that the Examiner believes that it may be helpful to advance the prosecution of this application, the Examiner is invited to contact the undersigned at the local Washington, D.C. telephone number indicated below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

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Date: October 31, 2003

JP8-259743A (Translation-in-part)

Title of the invention:

COLORING AGENT COMPOSITION CONTAINING TITANIUM DIOXIDE TREATED WITH METHYL HYDROGEN POLYSILOXANE

Application No. 65696/1995

Filed on: March 24,1995

Page 2, left-hand column 1, lines 6 to 12

[0001]

[Technical Field] The present invention relates to a coloring agent composition suitable for coloring of polyolefin molded articles, especially thin films such as polyolefin film and sheet, and particularly relates to a polyolefin coloring agent composition which contains titanium dioxide subjected to specific surface treatment and can provide a molded article being excellent in dispersibility and resistance to yellowing.

Page 2, left-hand column 1, lines 29 to 40

[0004] Generally to polyolefin resins are added various phenol derivatives as a stabilizing agent for an antioxidant in order to prevent deterioration due to oxidation. However it is said that when a phenol derivative in an antioxidant is contained in polyolefin, the derivative is bonded to an active site of a surface of titanium dioxide and produces a yellow or brownish yellow substance, thus causing yellowing of a plastic. Also when the resin is allowed to stay in a dark place for a long period of time, the phenol derivative undergoes autoxidation to be formed into red

quinone due to introduction of oxygen irrespective of presence of titanium dioxide and turns to pink. There is a case where a phenol stabilizing agent forms a brownish yellow nitrosophenol in the presence of nitrogen oxide, thereby yellowing a polyolefin resin.

<u>Page 2, right-hand column 2, lines 4 to 12</u>

[0007] The present invention is then explained below in detail. The polyolefin resin to be used in the present invention is a known resin. The resin is a low density, medium density or high density polyethylene resin in case of polyethylene, and is a homo-, blocked- or random-polypropylene resin in case of polypropylene. The resin is a thermoplastic resin comprising such a resin or a mixture thereof. The titanium dioxide to be used in the present invention is a rutile titanium dioxide having a particle size distribution of 0.05 to 0.45 μm and an average particle size of 0.20 to 0.30 μm. The methyl hydrogen polysiloxane is represented by the following formula:

$$\left(\overset{\displaystyle H}{\underset{\displaystyle CH_3}{\mathrm{Si}}} - \mathrm{O} \right)_n$$

wherein n represents a positive integer.

<u>Page 2, right-hand column 2, line 42 to page 3, left-hand column 1, line 4</u>

[0012]

[Example] The present invention is explained below in detail by means of

examples and comparative examples.

Method of evaluating degree of yellowing

(1) Yellowing by black lamp (Yellowing is evaluated by placing an injection-molded sample plate 20 cm below a 20 W black lamp having a wavelength range of 300 to 400 nm)

After the coloring agent compositions prepared in the following Examples and Comparative Examples were subjected to 10-day exposure to a black lamp, a degree of yellowing of the coloring agent composition was determined by measuring a color difference (ΔE) with a color and color difference meter.

(2) Yellowing under high temperature and high humid conditions

A degree of yellowing was determined by measuring a color difference in the same manner as in above (1) after allowing to stay for 96 hours under the conditions of 80°C and 100 % RH.

Page 3, left-hand column 3, lines 5 to 12

[0013] After kneading, with two rolls, 100 parts by weight of polyethylene resin (specific gravity: 0.957, MFR: 6.0 g/min), 0.4 part by weight of titanium dioxide pigment ① (content of methyl hydrogen polysiloxane: 0.11 %), 0.1 part by weight of polyethylene wax (molecular weight: 4,300, specific gravity: 0.924) and 0.1 part by weight of BHT (2,6-di-tert-butyl-4-methylphenol), a 1 mm thick pressed sheet was produced and was evaluated by the above-mentioned methods (1) and (2).